

Genetics and Native Fish Conservation: Two Examples from the National Parks



Peter Dratch and John Wulschleger

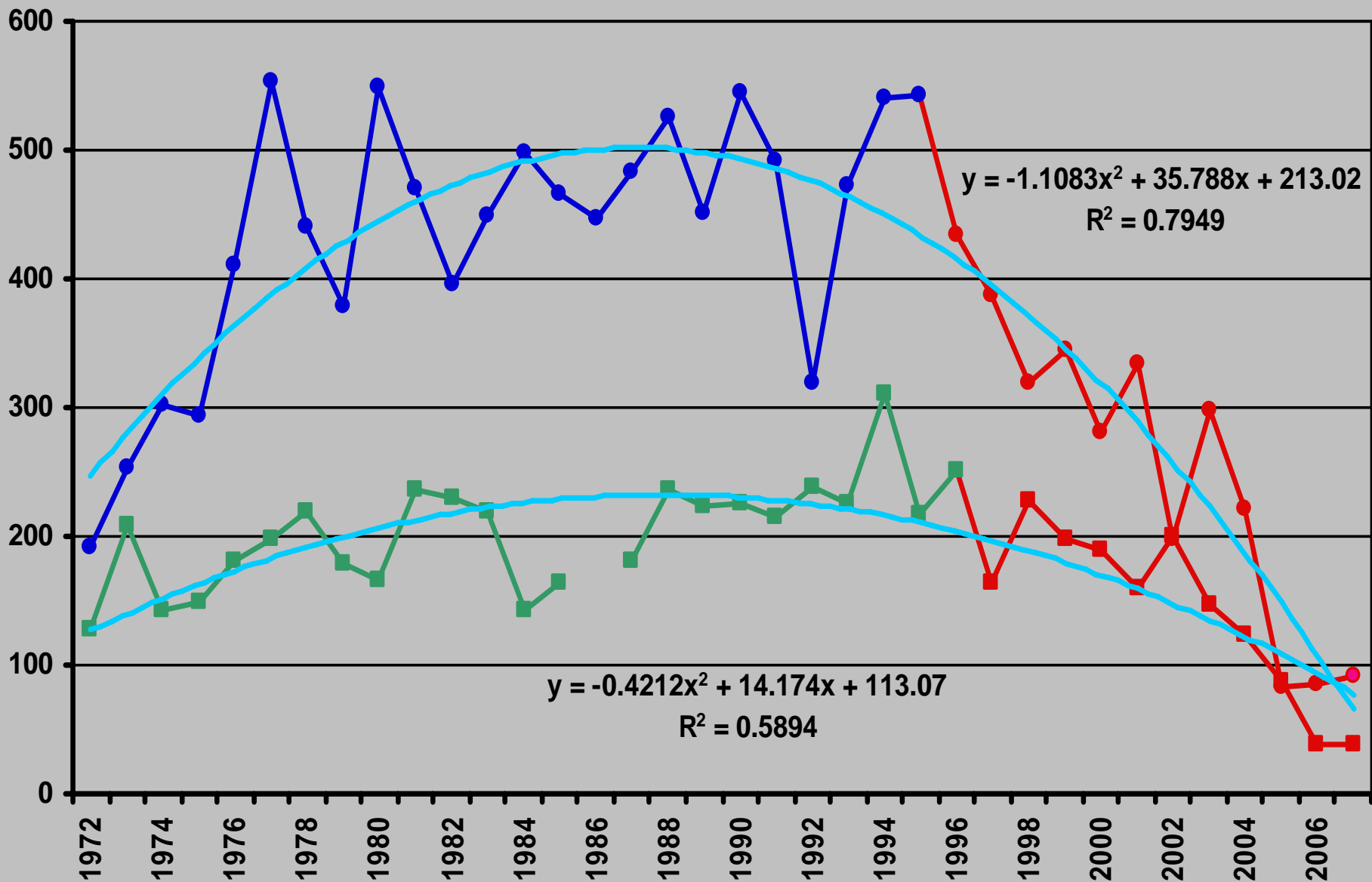
Pat Clayton@fisheyeguyphotography



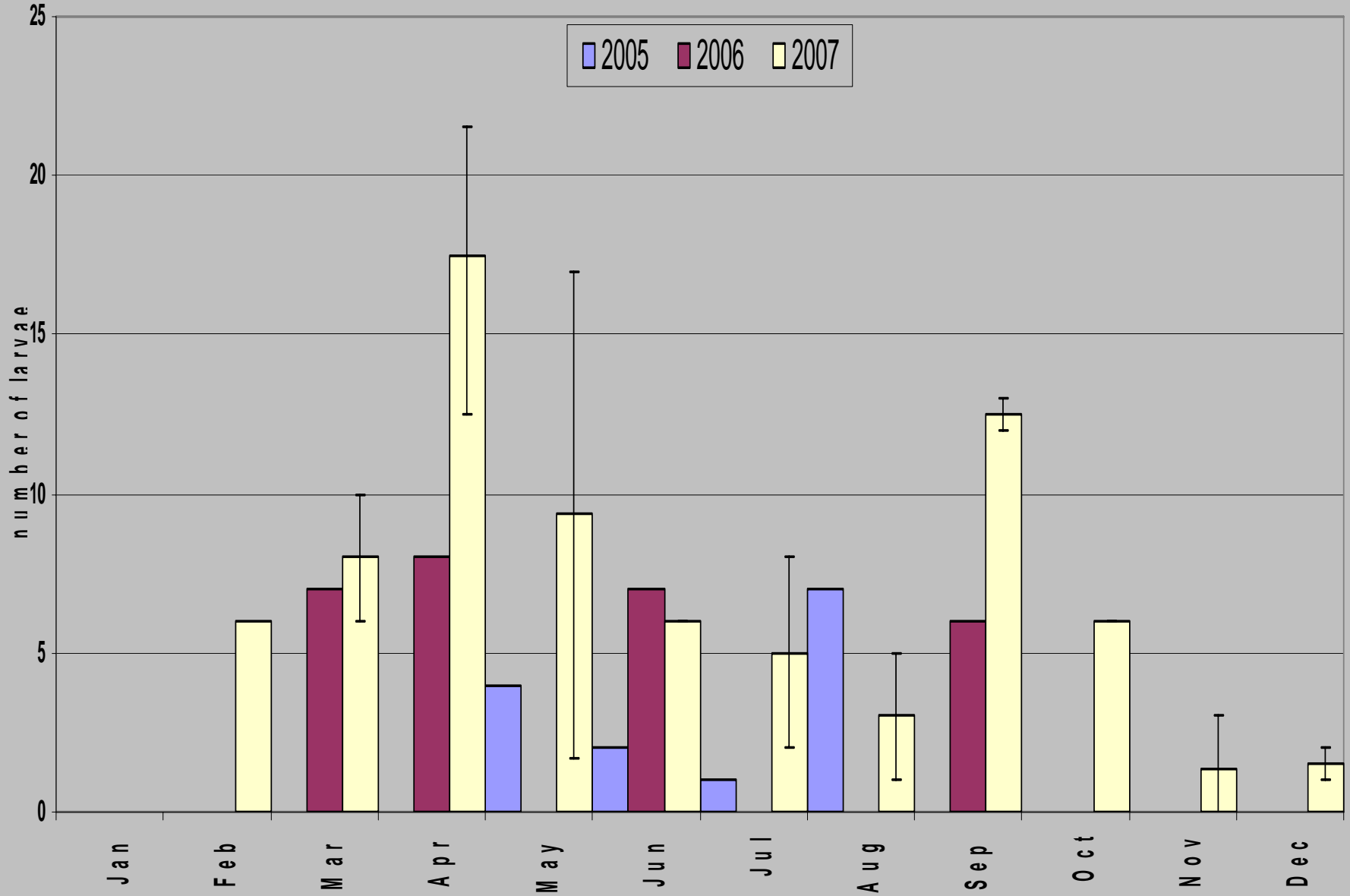
Devils Hole Pupfish

Diabolis cyprinodon

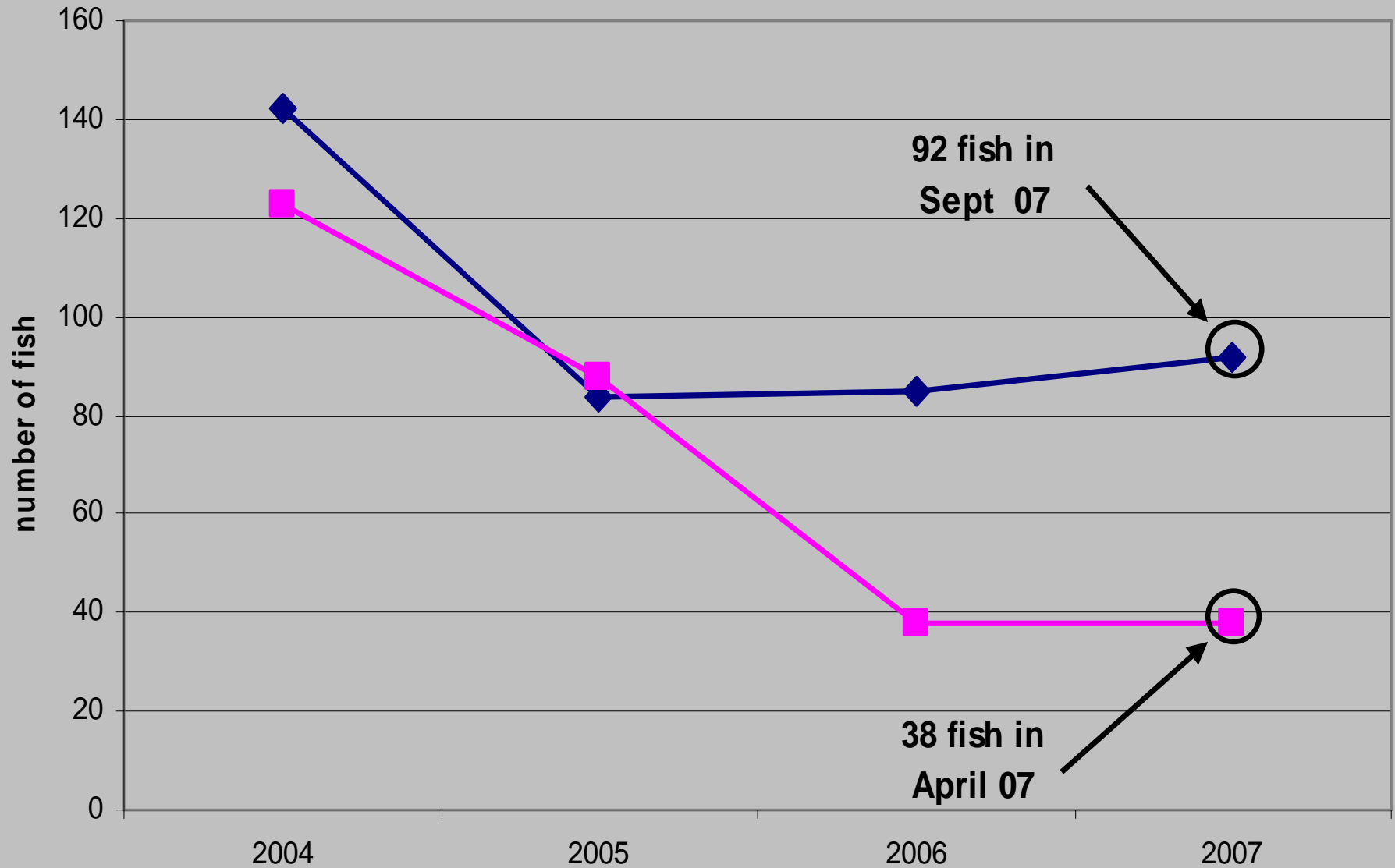
Devils Hole
Cyprinodon diabolis
1972 - 2007



Cyprinodon diabolis
larval surveys



Cyprinodon diabolis
Count Data
2004-2007



Artificial Propagation Pools established to preserve the Devils Hole Pupfish

- School Springs
- Point of Rocks
- Hoover Dam

All fish from Devils Hole or other artificial pools.

No propagation pool fish have gone back into Devil Hole.

Bayesian Classification by Tony Eschelle

- Assigned each fish to one of three populations
 - Devils Hole Pupfish
 - Point-of-Rocks
 - Ash Meadows Pupfish
- STRUCTURE analysis 1
 - $K = 3$ (POR, Hoover Dam, AMP)
 - Admixture assumed
- STRUCTURE analysis 2
 - $K = 3$
 - Used population information

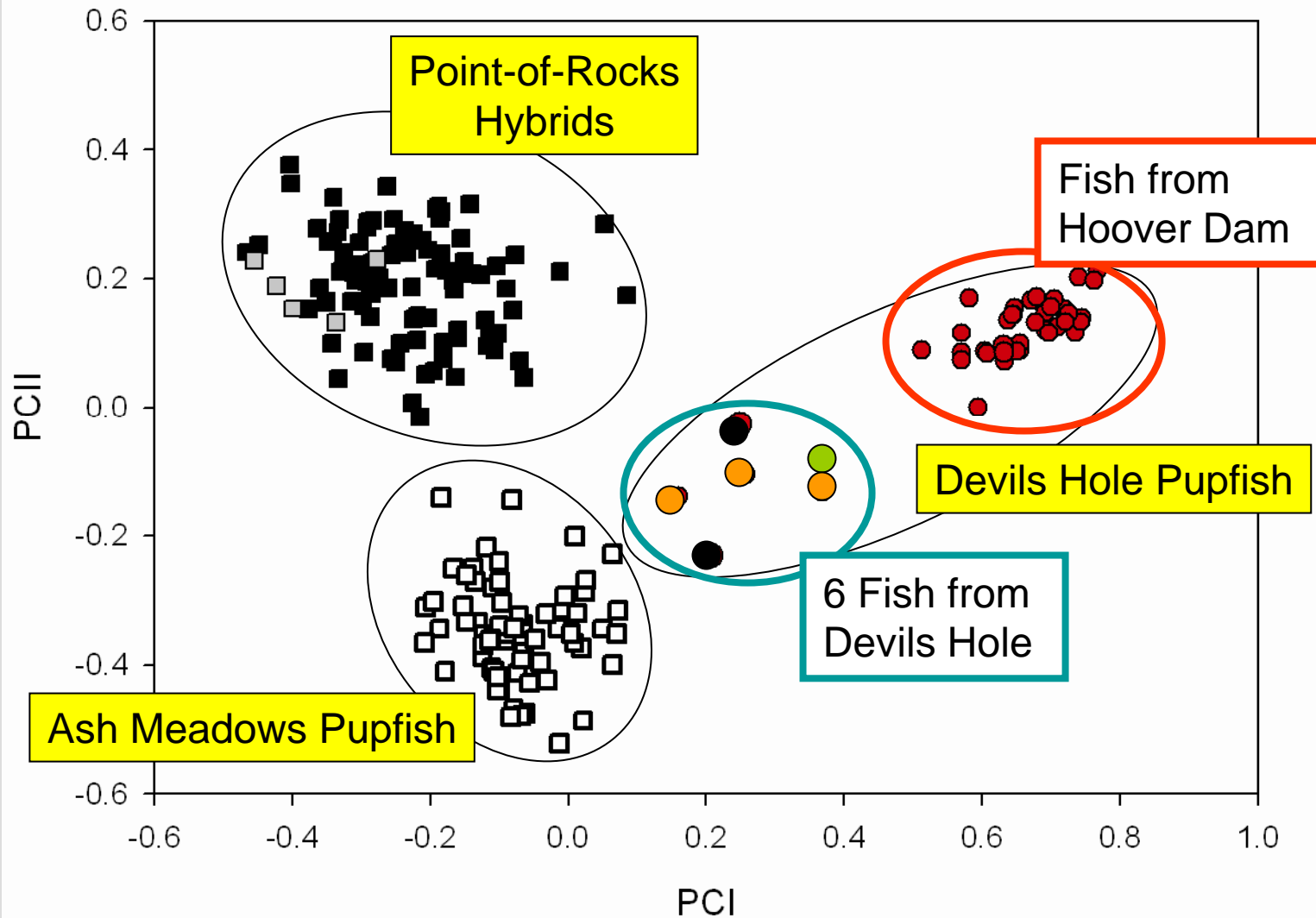
Result:

With 6 exceptions, all fish correctly assigned at >95% probability

Exceptions:

DHP001	DHP128
DHP008	DHP161
DHP009	DHP162

Principle Components Analysis



New Genetic Management Plan Drafted for the Devils Hole Pupfish

- Present stock of propagation pools not suitable for return to Devil Hole
- Large artificial propagation population needed to offset the effects of drift
- Genetic rehabilitation considered
 - Involves introducing unrelated individuals
 - Reducing deleterious alleles
 - Legal implications must be evaluated

Change in Distribution of Native Trout Species

Electrofishing as part of
a trout restoration effort
at Rocky Mountain
National Park



Change in Distribution of Native Species

- Colorado River cutthroat trout
 - Native to the west side of the continental divide
- Greenback cutthroat trout
 - Native to the east side of the continental divide
- Traditional methods of classification
 - Geography
 - Observed characteristics



Change in Distribution of Native Species

- New genetic data
 - two mtDNA regions
 - Microsatellites
 - AFLPs
- Native species stocked outside of their natural ranges
- Colorado River cutthroat trout were used as a source for “greenback” restoration projects



Egg collection – Chris Kennedy

State defends greenback cutthroat trout

By The Associated Press

Article Last Updated: 09/27/2007 02:37:21 PM MDT



GREENBACK CUTTHROAT TROUT



COLORADO RIVER CUTTHROAT TROUT

The endangered greenback cutthroat trout is shown on the left, and the Colorado River cutthroat trout is to the right.
(Colorado Division of Wildlife)

Denver — State officials are defending the state-federal restoration of a rare native Colorado fish despite a study showing that some waterways have been stocked with the wrong fish.

There are many who care – and the information is out there

Change in Distribution of Native Species

The consequences of this new information include:

- Restorations are on hold
- Genetic analyses are being conducted on most cutthroat populations
- Conservation and recovery objectives and strategies may change
- Future management including listing status could change

Conclusions (no brainers)

- New genetic information will call into question previous sound management
- The data cannot be ignored
- Nor can it be the only consideration



Particular
Thanks to

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Mary Kay Watry

